

WHAT IS CLAIMED IS:

1. An apparatus comprising a circuit that includes:  
a first portion which is coupled between first and  
5 second nodes and which includes a resonant tunneling  
device;

a second portion which is coupled between said first  
and second nodes and which has an electrical reactance  
that includes at a selected frequency a complex conjugate  
10 reactance of a reactance of said resonant tunneling  
device at said selected frequency, so that at said  
selected frequency said complex conjugate reactance  
substantially cancels said reactance of said resonant  
tunneling device.

15 2. An apparatus according to Claim 1, wherein said  
resonant tunneling device is a resonant tunneling diode.

20 3. An apparatus according to Claim 1, wherein said  
first portion includes a further resonant tunneling  
device, said resonant tunneling devices being coupled in  
series with each other between said first and second  
nodes.

25 4. An apparatus according to Claim 1, wherein said  
selected frequency is greater than 100 GHz.

30 5. An apparatus according to Claim 1, wherein said  
second portion includes an inductor which is coupled  
between said first and second nodes, said complex  
conjugate reactance including an inductance of said  
inductor.

5       6.   An apparatus according to Claim 5, including a blocking capacitor, said inductor and said blocking capacitor being coupled in series with each other between said first and second nodes.

10       7.   An apparatus according to Claim 1, wherein said second portion includes a transmission line having two conductors which are respectively coupled to said first and second nodes, said complex conjugate reactance including an inductance of said transmission line.

15       8.   An apparatus according to Claim 7, wherein said transmission line is an open line having an electrical length which is between one-quarter and one-half of the wavelength of said selected frequency.

20       9.   An apparatus according to Claim 7, wherein said transmission line is a shorted line having an electrical length which is less than one-quarter of the wavelength of said selected frequency.

25       10.   An apparatus according to Claim 9, including first and second blocking capacitors which are each coupled between a respective terminal of said resonant tunneling device and a respective said conductor of said transmission line.

11. An apparatus according to Claim 1, including a transformer having first and second coils, said second coil being coupled between said first and second nodes and being part of said second portion of said circuit, said complex conjugate reactance including an inductance of said second coil.

12. An apparatus according to Claim 1, wherein said second portion includes a plurality of components with respective impedances that collectively define said complex conjugate reactance, said plurality of components including at least one inductor and at least one capacitor.

13. An apparatus according to Claim 1, wherein said reactance of said resonant tunneling device includes an intrinsic capacitance and a terminal reactance of said resonant tunneling device.

14. An apparatus according to Claim 1, wherein said reactance of said resonant tunneling device includes an intrinsic capacitance of said resonant tunneling device but excludes a terminal reactance of said resonant tunneling device.

15        15.    A method of operating a circuit that includes a  
first portion which is coupled between first and second  
nodes and which includes a resonant tunneling device, and  
a second portion which is coupled between said first and  
second nodes, said method comprising:

10            causing said second portion to exhibit at a selected  
frequency an electrical reactance that includes a complex  
conjugate reactance of a reactance of said resonant  
tunneling device at said selected frequency, so that said  
complex conjugate reactance substantially cancels said  
reactance of said resonant tunneling device at said  
selected frequency.

15        16.    A method according to Claim 15, including  
selecting a resonant tunneling diode to serve as said  
resonant tunneling device.

20        17.    A method according to Claim 15, including  
selecting a frequency in excess of 100 GHz to be said  
selected frequency.

25        18.    A method according to Claim 15, including  
configuring said second portion to have an inductor which  
is coupled between said first and second nodes, said  
complex conjugate reactance including an inductance of  
said inductor.

19. A method according to Claim 15, including configuring said second portion to have a transmission line with two conductors that are respectively coupled to said first and second nodes, said complex conjugate reactance including an inductance of said transmission line.

20. A method according to Claim 15, wherein said selecting of said reactance of said resonant tunneling device is carried out to include an intrinsic capacitance and a terminal reactance of said resonant tunneling device.

21. An apparatus according to Claim 15, wherein said selecting of said reactance of said resonant tunneling device is carried out to include an intrinsic capacitance of said resonant tunneling device and to exclude a terminal reactance of said resonant tunneling device.